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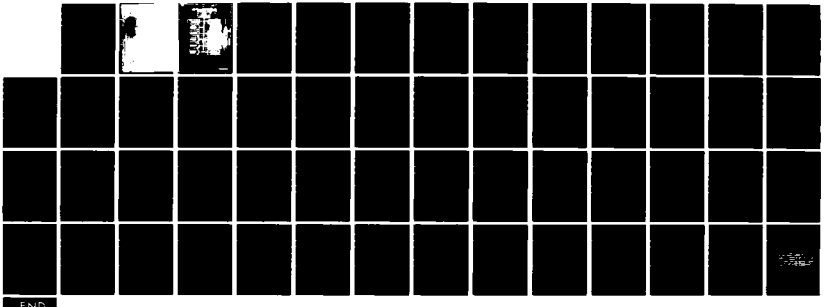

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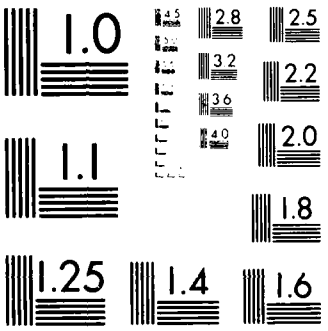

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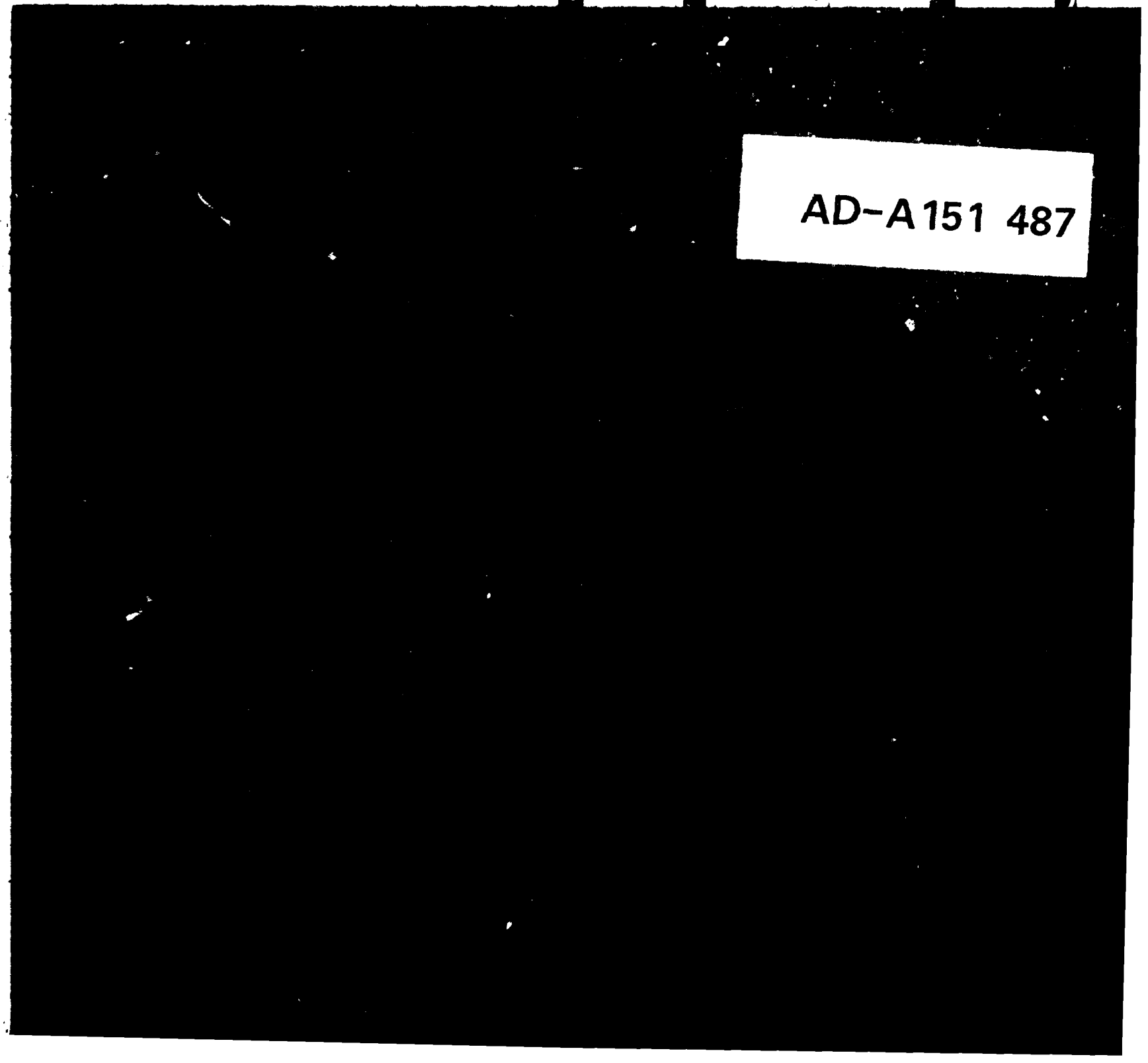
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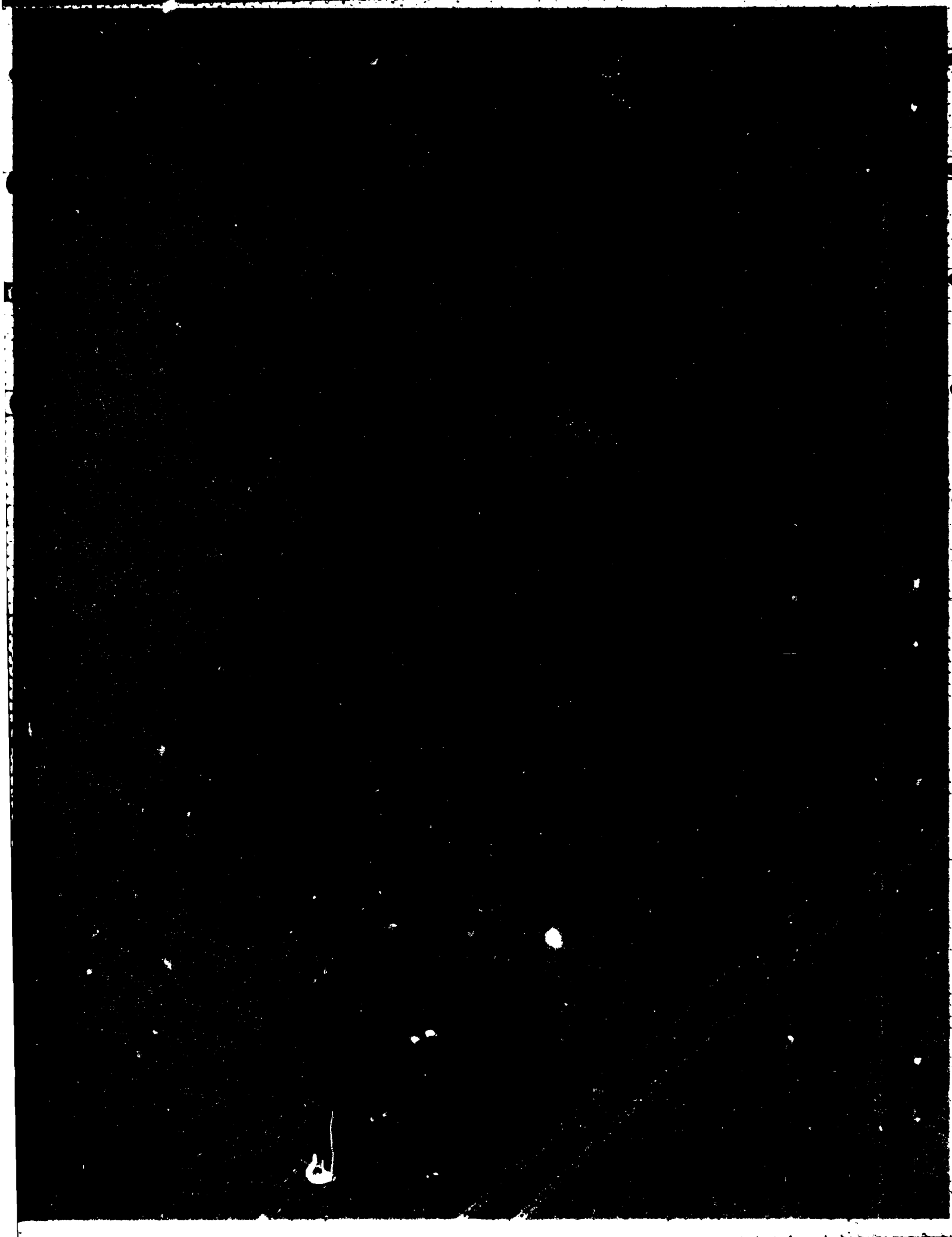

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This report is a user's manual for an Automated Data Processing workstation at the Navy Supply Systems Command. The workstation is built around a Radio Shack Model II microcomputer and was established to support data processing in the design and analysis of alternative approaches that would satisfy specific warehousing requirements. A unique feature of this workstation is its voice output in addition to screen display and printed output.

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Voice output was designed into the workstation to allow use of the workstation by a totally blind user who cannot function independently in the workstation without voice output. For users not requiring voice output, the workstation functions without any loss of capabilities. This user's manual describes all the components of the workstation and the use of the workstation with or without voice output.

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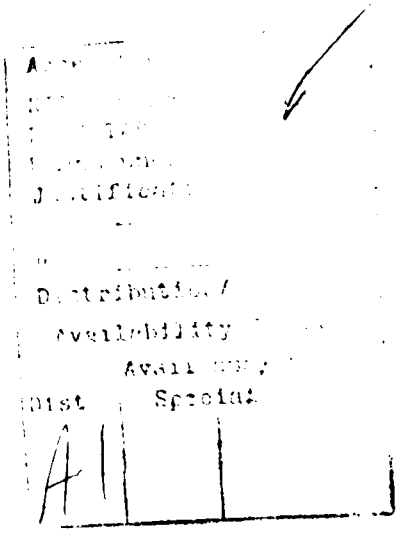
ABSTRACT

This report is a user's manual for an Automatic Data Processing workstation at the Navy Supply Systems Command. The workstation is built around a Radio Shack Model II microcomputer and was established to support data processing in the design and analysis of alternative approaches that would satisfy specific warehousing requirements. A unique feature of this workstation is its voice output in addition to screen display and printed output. Voice output was designed into the workstation to allow use of the workstation by a totally blind user who cannot function independently in the workstation without voice output. For users not requiring voice output, the workstation functions without any loss of capabilities. This user's manual describes all the components of the workstation and the use of the workstation with or without voice output.

ADMINISTRATIVE INFORMATION

This user's manual was developed as a task of the Computer Aided Warehouse Design Project under sponsorship of the Research and Technology Division (Code 033B) of the Naval Supply Systems Command (NAVSUP) and functional management of the Warehousing Branch (Code 0621) of the Material and Facilities Division. The task was performed at the David W. Taylor Naval Ship Research and Development Center by the Logistics Division (Code 187) of the Computation, Mathematics, and Logistics Department under Program Element 627690N, Project F60531, Task Area TF 60531001, and Work Unit 1872-416.



SECTION 1

INTRODUCTION

1.1 OVERVIEW

This user's manual is organized into three sections and three appendixes. Section 1 presents general introductory information highlighting background and workstation design considerations. It also gives the objective and scope of the manual. Section 2 describes each component of the workstation and how to set up each for operations. Section 3 gives specific procedures for the startup of the workstation components. It also gives procedures for specific tasks such as telecomputing and running basic programs. Backup and supporting information are contained in the appendixes.

1.2 BACKGROUND

The data processing workstation in the Navy Supply Systems Command (NAVSUP), Code 0621C, was established to support computer operations associated with the Computer Aided Warehouse Design project under development by the David W. Taylor Naval Ship Research and Development Center (DTNSDC). This research and development project applies computer technology to the analysis of alternative warehouse designs in satisfying specific warehousing requirements.

An analysis of the requirements for a data processing workstation to support the Computer Aided Warehouse Design project revealed that a workstation, built around a microcomputer, was sufficient for most tasks expected to be performed at the workstation. Other tasks in which the inherent computing power of a microcomputer is not sufficient can be done on a remote mainframe computer with the microcomputer serving as an intelligent terminal.

A major consideration in designing the workstation was the unique requirements of its users. In order for the workstation to have the greatest

potential use for the range of functions within NAVSUP Code 0621C, the system manager needs a capability for direct use of the system. In this case the system manager is totally blind and, therefore, the workstation must be capable of speech output in addition to normal screen display and printed output. Of equal importance with direct access to the system by the system manager was the requirement that the custom features of this workstation, which make speech output possible, have little or no impact on other users.

The other hardware and software needed for the workstation include a printer, a modem, an operating system capable of controlling this equipment, and the Kurzweil Reading Machine. The Kurzweil Reading Machine is available in NAVSUP 0621C and is used as a stand-alone system for speech output reading of printed documents. The required equipment characteristics of the workstation are that:

1. The microcomputer must have a minimum of 64,000 bytes of random access memory (RAM), two RS-232 compatible ports, and one parallel printer port. It must be capable of functioning as a normal microcomputer for users not needing the speech output capability.

2. The printer must be a letter quality terminal printer (printer with a keyboard) so that it can serve as an input device to the microcomputer just like its own keyboard. The printer must have a 2000 character input buffer.

3. The modem must be an autodial and autoanswer modem capable of communicating at 1200 baud.

4. The only specification involving software is that the microcomputer's operating system must be capable of controlling the Kurzweil speech output system and must have commands to facilitate use of the workstation by someone who has to depend entirely on speech output to function at the workstation.

These specifications were submitted to several vendors who were requested to bid on the entire package. The contract to provide the components of the workstation was awarded to Computorizm Developers, a firm in Clinton, Kentucky, specializing in customizing microcomputer systems. A brief description of the custom software developed by Computorizm Developers is presented in Appendix A.

1.3 OBJECTIVE

This report describes the data processing workstation established within NAVSUP, Code 0621C, by DTNSRDC. This description provides a single user's manual covering all components of the workstation and the basic procedures for using the workstation.

1.4 SCOPE

This report describes only the workstation itself. It is not intended as a substitute for the manuals accompanying the equipment. In a single document it gives an overview of the workstation including a brief description of each piece of equipment and specific steps for using the workstation to accomplish some of the tasks for which the workstation was designed. The report does not describe application software developed as part of the Computer Aided Warehouse Design project. It will serve as a user's manual for the use of the workstation with or without speech output.

SECTION 2

THE WORKSTATION COMPONENTS

2.1 OVERVIEW

Figure 1 shows a diagram of the five pieces of hardware and interconnecting cables that form the workstation. All cables are flat ribbon of type RS-232, and each is long enough to allow flexibility in the arrangement of the equipment in the workstation. One cable is connected to each of the two RS-232 compatible serial ports* on the back of the microcomputer. The top port, labeled A, is connected to the port on the Interface Box labeled COMPUTER. The port labeled B, which is directly under port A, is connected to the modem. The cables connected to ports A and B require male connectors at both ends.

The Interface Box has three ports which connect the microcomputer to both the printer and the Kurzweil Reading Machine. These ports are labeled COMPUTER, PRINTER, and KURZWEIL. The computer port is on the side of the Box by itself. When the Interface Box is held with the computer port facing away from the holder and the two switches facing up, the PRINTER port is to the left and the KURZWEIL port is to the right. All three ports of the Interface Box require cables with male connectors. The cable from the Interface Box to the printer also has a male connector on the printer end. The cable from the Interface Box to the Kurzweil Reading Machine has a female connector on the Kurzweil end. This connection to the Kurzweil Reading Machine is the only one of the workstation requiring a female connector.

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*A port is a slot or jack into which external devices may be plugged. The prevailing standard for serial ports in microcomputers is the RS-232.

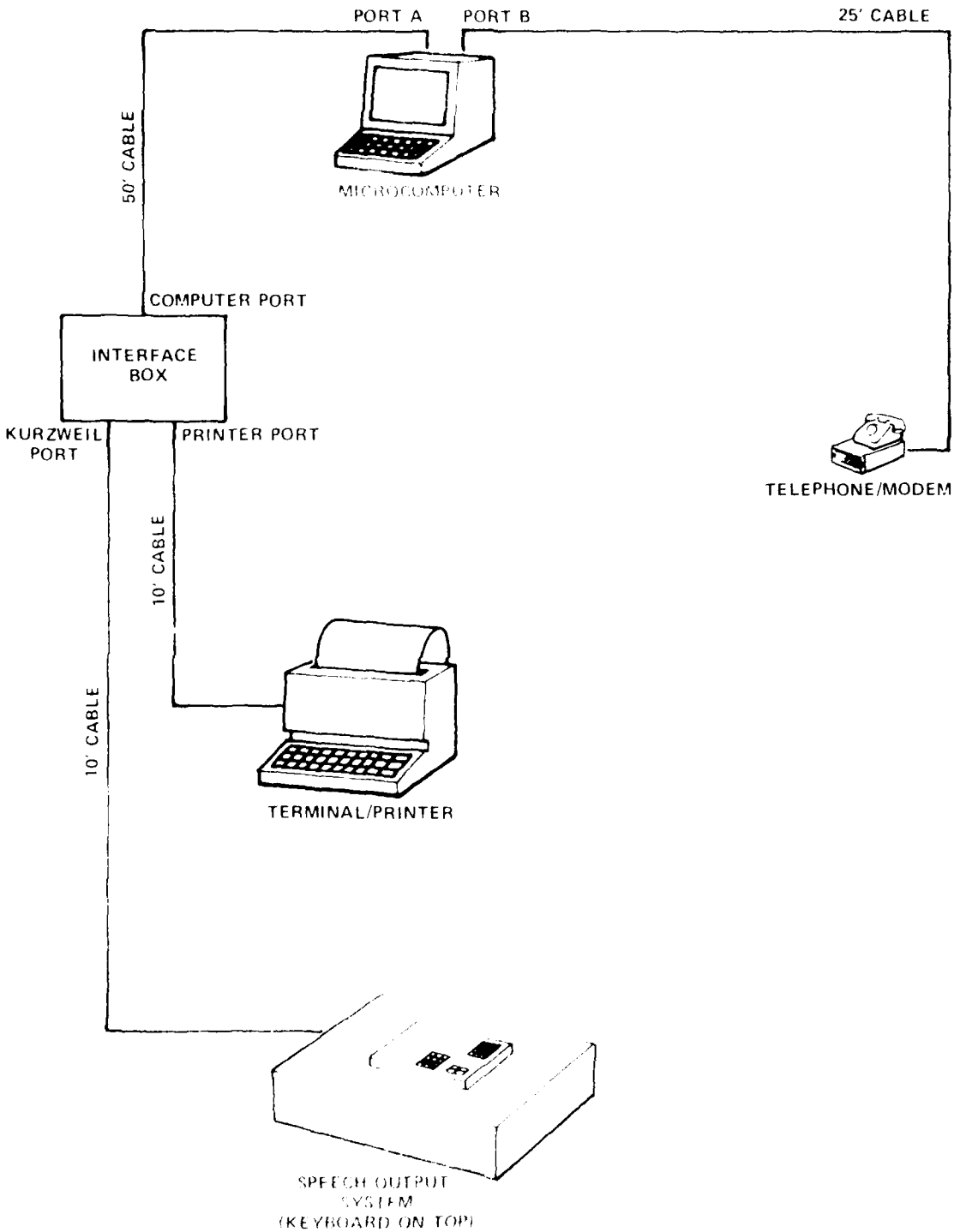

Figure [illegible] Interface Components and Layout

The modem has three switches in the recessed area on the front. The switch to the extreme left as you face the modem is labeled FA (force answer) [illegible] the user is manually answering a call for the microcomputer. [illegible] autoanswer modem and the user should have very little [illegible] answer for the microcomputer. Since the microcomputer [illegible], it will answer only when it has been configured to communicate and is in a waiting state to respond to a call over the modem. Therefore, the microcomputer will respond to a call only if the user expects a call and has prepared the system for it. The modem should be set for autoanswer [illegible] call. After all three switches on the front [illegible] the modem has been described, three examples will be given to illustrate when manual procedures may be appropriate.

The second switch is a two-position switch labeled HS (high speed). The up position is the high speed position. This switch is overridden when the modem is in the automatic mode. In the manual mode, this switch is set at low for 300-baud communication and at high for 1200-baud communication.

The last switch (third from left) is a three-position switch. The top [illegible] data, the center position is labeled VO for voice, [illegible] manual answer. This switch should [illegible] autoanswer operations and for normal [illegible] for manual answer of calls to the [illegible] can be used for normal voice [illegible] The DA position is used [illegible] originate operations. In both opera- [illegible] when the data tone is received

how to use the machine for reading printed material needs learn only a few additional procedures to use this machine in this workstation. Those procedures will be described in Section 3.

2.2 RACAL-VADIC MODEL VA3451 MODEM

The workstation component which allows the Radio Shack Model II to exchange information with other computers is the RACAL-VADIC model VA3451 modem. This exchange of information between computers is called telecomputing and is made possible by the modem. A modem translates digital data from the microcomputer to sound signals that can be transmitted over telephone lines and converts sound signals from the modem of the remote computer back into digital data for the microcomputer. The RACAL-VADIC model VA3451 is compatible with 103-type modems at baud rates of 300 or lower and with 212-type or VA3400-type modems at 1200 baud.

The modem receives its electric power from a three-prong transformer which plugs into a 120-volt ac socket. The modem has no on/off switch and is always on and in a waiting state even if it is not being used. The six status lights across the front of the modem indicate the status of the modem. The [illegible] DTR (data terminal ready) should be the only light glowing when [illegible] not in use. Other lights glowing indicate an error condition. [illegible] correct the error condition is to check the two test [illegible] side by side on the left as [illegible] the right on the back [illegible] position switch; the center [illegible] two-position switch with [illegible] in the off position for [illegible].

will then say the name and function of that key. The function of the key is not activated during the identification process.

This machine, in its basic mode, provides direct access to printed and typewritten information for the blind or visually impaired. It was acquired by NAVSUP 0621C in 1979. Until it was integrated into this data processing workstation, its functions were to convert ordinary printed materials (books, magazines, correspondence, etc.) into spoken English and to perform as a talking programmable calculator.

Users who do not require speech output do not have to take any action in regard to this machine. It is completely off-line as far as their operations are concerned. If the Kurzweil is to be used in a stand-alone mode, the fact that it is a component of this workstation is of no consequence and its use does not interfere with the workstation in any way.

The Speech Output System mode of the Kurzweil Reading Maching was installed in the Kurzweil Reading Machine to enable it to read input received through the RS-232 port. The Speech Output System is a mode of the Kurzweil Reading Machine that permits the user to hear text transmitted or received at a computer terminal. The Kurzweil is a receive-only device and not a terminal. It functions much like a printer, but instead of translating signals received to printed text, it translates them into spoken English. Unlike a printer which receives signals, converts them to printed characters, and then forgets them, the Kurzweil remembers what it receives up to the limit of its buffer and can be directed to repeat stored text as many times as the user desires.

Once the Kurzweil has been configured to receive text over the communication link, all other functions of reviewing text stored in the buffer are the same as with reading printed material. Therefore, the user who [illegible]

upper case. Case is controlled on this keyboard by the LOCK key located to the left of the A key. The LOCK key is a two-position key. The down position locks the keyboard in the upper case mode. Depressing the key so that it returns to the up position will put the keyboard back in the lower case mode.

The LOCK key puts the entire alphanumeric section of the keyboard (alphabetic, numeric, and punctuation keys) in the upper case mode. This results in a lot of activating and deactivating the LOCK key in executing TRSDOS commands. An alternative to this frequent use of the LOCK key is to enter letters from the main keyboard and numbers and punctuation marks from the numeric keypad section of the keyboard (see Section 2.4.5). The numeric keypad section is not affected by the LOCK, SHIFT, or any special function keys.

2.4.5 Numeric Keypad Section

The numeric keypad section of the keyboard consists of 15 keys in calculator fashion to the right of the typewriter-like section.

2.5 KURZWEIL SPEECH OUTPUT SYSTEM

The speech output component of the workstation is the Kurzweil Reading Machine, a table-top computer device. Its software resides on tape which loads automatically when the machine goes through its initialization after the power is turned on. The user selects the reading function to be performed by depressing the appropriate keys on a small keyboard attached to the machine by a cord. The keys are not labeled, but a special key called the NOMINATOR key assists users in identifying keys. The function of the NOMINATOR key is to give the name and functions of all keys including itself by voice output. The user first presses the NOMINATOR key and then the key in question. The machine

selected when the key is in the down position; this position disconnects the terminal from the communication link. If the user is printing a document and wants only speech output, then the LOCAL key should be in the down position to take the printer off-line from the microcomputer. Users of this workstation who do not require the speech output system will always want the LOCAL key in the up position. When the speech output system is in use, this key should be in the up position for normal communications with the microcomputer. If the user wants both speech output and printed output, the LOCAL key must be in the up position.

The key under the LOCAL key is labeled MARG CONT (Margin Control). In the down position, the margin control function of the printer is activated. This function is used if the user chooses to control the formatting of output with the printer rather than with the microcomputer. Format control with the microcomputer is the normal mode; however, this feature of the printer is quite useful for formatting text files that have not been formatted with word processing or other formatting techniques. The availability of a good word processing capability will minimize the need for format control by the printer.

The key under the MARG CONT key is the LINE EDIT key. No use of this key can be foreseen for this workstation and therefore this key should always be in the up position. When this key is in the down position, the printer does not transmit until a carriage return or line feed is typed.

2.2.4 Keyboard Alphanumeric Section

The alphanumeric section of the keyboard is the typewriter-like section of the keyboard. The TRSDOS commands issued from this keyboard, like TRSDOS commands issued from the microcomputer's keyboard, must have all letters in

touched to indicate operations. The switches are labeled RESET, SCROLL, LF, FF, HERE IS, PAUSE, and BREAK.

The RESET causes the printer to resume operations after an error condition has been eliminated or after a PAUSE. This switch must be touched each time an error condition has been corrected before the printer will continue to operate. The SCROLL switch rolls the paper up so that the line under the print head can be read more easily. The paper stays in the rolled up position until the switch is released and then it returns to the normal position. The LF (Line Feed) switch sends the print head to the beginning of the next line. The FF (Form Feed) switch advances the paper to the top of the next page or to the top of whatever form size the user has established. The HERE IS switch can be programmed to send a message containing up to 31 characters to the host computer. The PAUSE switch is used to interrupt printer operations without any loss of data. This switch is used for conditions such as changing the ribbon during printing operations. The BREAK switch is used to send a break signal to the microcomputer when it is being controlled from the terminal/printer. The BREAK switch is not used if the terminal/printer is functioning as a printer. The PAUSE switch, as described above, is used instead. With the exception of the RESET and PAUSE switches, the other switches can be ignored for most operations since the printer can be controlled from the microcomputer.

2.4.3 Keyboard Control Section

This keyboard section consists of three keys in a vertical row to the left of the typewriter section of the keyboard. Each of these keys has an up or down position. The top key, labeled LOCAL, determines whether the printer is to function as a typewriter or as a terminal. The local or typewriter mode is

, PARITY, OVFL, RIBBON/PAPER, and COVER. The power
er is on. The other lights glow only to indicate
. The PAUSE indicator glows to indicate a condition
because the PAUSE switch has been pressed (see Section
). The PARITY indicator light should never glow unless
configured communication port A on the microcomputer or has
dip switch settings under the access cover of the printer. There
reasons for doing either. The proper dip switch settings for
printer are shown in Appendix B, and the proper configuration for communi-
port A is shown in Appendix A. These two appendixes should be consulted
eliminating parity errors.

the most likely one. It may occur when the system is
Kurzweil Reading Machine and when the DATA RATE CONTROL
set to the KURZWEIL position. When the DATA RATE CONTROL
Kurzweil position, the microcomputer receives its overflow
Kurzweil and not from the printer. This error condi-
setting the DATA RATE CONTROL switch to the Inter-
position.

conditions are obvious.
after these error conditions
printer will continue.

, at the same time above the keyboard to the
, are touch type membrane keys which control several
. A buzzer is sounded each time one of these switches is

The speech output device is located in the system manager's work space where it is used as a stand-alone speech output system independent of this workstation. With the printer located next to the Kurzweil Reading Machine, the system manager has both input and output control of the microcomputer from his desk. This arrangement of the workstation's hardware allows the system manager to use the Kurzweil Reading Machine as usual when he is not using the microcomputer. Other users of the workstation will enter their input from the keyboard on the microcomputer. The only effect of this arrangement of the hardware on those other users is that the printer is not as close to the microcomputer as it would be in a similar workstation not requiring speech output.

The power to the printer is turned on by the rocker switch located on the [illegible] side of the back panel. When the power is turned on, the printer goes [illegible] an initialization process which is evident to the user who can see and [illegible] the carriage move slowly to the left margin and then to the right, and [illegible] at the first print position. The power indicator light will glow red. The printer is now ready for use.

The keyboard of this printer has a full ASCII character set. The keyboard is more elaborate than the keyboard of a regular typewriter because this [illegible] can perform many functions in either the normal printer or terminal [illegible]. The keyboard has five distinct sections which include control panel [illegible], control panel switches, keyboard control keys, alphanumeric keys, [illegible] keys.

[illegible] control panel indicators

The control panel indicators are about an inch above the keyboard starting [illegible] and extending to the "6" key. These indicator lights are

system, making it difficult to hear the speech output clearly. Control over the microcomputer can be regained at any time by putting the printer back in the remote mode.

The two positions of the other switch on the Interface Box are labeled DTE and DCE. This switch configures the KURZWEIL port for use as a terminal device (DTE) or as a communication device (DCE). Since the Kurzweil is a communication device, this switch should always be set to DCE which is the left position.

2.4 DIABLO MODEL 630 KSR TERMINAL PRINTER

The workstation component for printed output is the Diablo Model 630 KSR terminal printer.[2,3] Unlike most printers which are "receive only" devices, the Diablo KSR Model 630 is a sending as well as a receiving device. As a receiving device, it functions like any receive-only printer. As a sending device, it can be used as a stand-alone terminal which can communicate with host computers over a modem or direct terminal-to-computer connection as is done in this workstation.

The purpose of having a terminal printer in this workstation is twofold: the workstation needs a good letter quality printer, and, this type of printer makes it possible for the printer, or more specifically its keyboard, to be used as an auxiliary to the keyboard on the Radio Shack Model II. The microcomputer, with the appropriate setup, will respond to keyboard input from either its keyboard or the printer's keyboard. This capability to control keyboard input to the microcomputer from two locations facilitates use of the workstation by the system manager, who, as stated before, is totally blind and must receive speech output from the microcomputer.

of these commands have punctuation and numbers, and with the keyboard in the CAPS position, no shifting or striking case control keys is necessary.

The numeric keypad to the right of the keyboard can be used for all numeric input. The number keys on the numeric keypad are laid out in the familiar calculator pattern. The numeric keypad is used primarily for input of large quantities of numeric data.

2.3 INTERFACE BOX

The Interface Box was designed and fabricated by Computorizm Developers. It controls communications between the microcomputer and the printer, between the microcomputer and the Kurzweil Reading Machine, or between the microcomputer and both the printer and Kurzweil Reading Machine. The Interface Box forms a Y-like connection in the cable from the microcomputer so that it can be connected through one cable to both the printer and the Kurzweil Reading Machine.

The Interface Box has two slide switches, each with two positions. If the Interface Box is held with the switches up and the computer port facing away from the user, the DATA RATE CONTROL switch is to the left. The left position of the DATA RATE CONTROL switch is labeled P for PRINTER and the right position is labeled K for KURZWEIL. The PRINTER position is always selected when the speech output system is not in use. When the speech output system is in use, the PRINTER position is selected if the user is printing data or using the printer's keyboard to control the microcomputer. The KURZWEIL position is selected when speech is the only output desired. If only speech output is desired, the user should also put the printer in the LOCAL mode (see Section 2.4.3). Otherwise, it will print what is being spoken by the speech output

number in the format ERROR number such as ERROR 19. This display by itself is not useful to new users until they remember the meanings associated with the error numbers. Until that time, after an error number is displayed, the user should issue the command ERROR number. The system will respond with the meaning of that ERROR.

2.2.2 Keyboard Operations

The keyboard of the Radio Shack Model II is similar to that of a standard typewriter except for the special function keys and the numeric keypad to the right of the typewriter-like section.

When the electric power to the microcomputer is turned on, the keyboard is automatically set for lower case characters. The TRSDOS commands must be issued in all capital letters. The keyboard has two keys to control whether characters are in upper or lower case. One key labeled LOCK, is located to the left of the A key. This key locks in the upper case mode, the alphabetic, punctuation, and numeric keys, and all other keys with regular typewriter-like functions. The other key which controls whether characters are in upper or lower case is the key labeled CAPS. This key is next to the SHIFT key on the right side of the keyboard. Depressing this key causes only the alphabet keys to be put into the upper case mode. Numbers and punctuation keys are not affected. Both of these case control keys have red lights to indicate the upper case mode. The physical position of either key is the same regardless of its state. The LOCK key is deactivated by hitting the SHIFT key. The CAPS key is a toggle key and is changed from one state to another by depressing it. Issuing TRSDOS commands in lower case will cause ERROR 19.

The CAPS key is more useful for the functions envisioned at this workstation because much of a user's time is spent typing in TRSDOS commands. The

must always be in the disk drive when the system is in operation. System diskettes are like other diskettes, called data diskettes, except that they can not store as much data because of the storage occupied by TRSDOS.

The operating system manages the resources of the microcomputer and controls its communications with all the peripheral devices such as the printer and modem. The operating system for the microcomputer of this workstation was customized to satisfy unique requirements, although it is essentially identical to the TRSDOS described in the Model II owner's manual.[1*] The customized features are essentially transparent to the user. Most TRSDOS commands will function as described in the user's manual. Where differences exist, they will be described in Section 3.

The owner's manual for the Radio Shack Model II is a comprehensive two-part document. The first part is the Disk Operating System Reference Manual, TRSDOS, and the second part is the Basic Language Reference Manual. The user should become familiar with both parts.

The operating system itself has features which make it easy to use. For instance, TRSDOS has a HELP command. If the user enters the command HELP, TRSDOS responds by displaying on the screen a list of commands for which it can offer help. The user who desires help with one of these commands enters the command HELP followed by that command, and TRSDOS responds by giving the format for that command. The HELP command can be useful for new users in learning the operating system commands. The ERROR command is also particularly useful for new users. When a user issues a command to TRSDOS which it cannot perform due to improper format or some other reason, TRSDOS responds by displaying an error

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*/ A complete listing of references is given on page 49.

microcomputer has a 76-key typewriter style keyboard with a full ASCII* character set. The keyboard attaches to the display console through a 2 1/2-foot cable. This cable allows the keyboard to be moved for the convenience of the user.

The Radio Shack Model II receives its electrical power from any regular 120 volt ac socket through a three-prong safety plug. The unit has an ac line filter and should not be susceptible to interference problems, but, as an added measure, the user should ensure that no heavy power-using device is plugged into the same circuit.

The microcomputer is turned on by flipping the power-on switch to the right of the display monitor. The Radio Shack Model II has a cooling fan which will be heard or its air motion felt as soon as the machine is turned on and which will run continuously until the power is turned off. No paper or anything which could obstruct the cooling operation of this microcomputer should be placed on the cabinet while the microcomputer is in operation. The microcomputer should not be in a tight space such as a cabinet. Detailed startup procedures for the microcomputer are given in Section 3.

2.2.1 TRS-80 Disk Operating System (TRSDOS)

The operating system, referred to as TRSDOS (commonly called Triss-Doss), resides on a diskette. Any diskette containing TRSDOS is referred to as a system diskette. A system diskette is always required to start up the system and

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*ASCII stands for American Standard Code for Information Interchange. Basically, it is a way of encoding characters (letters, numbers, punctuation, and special symbols) into standardized numbers that can be understood by any computer or computer device. ASCII was developed to allow computers to communicate with each other. The ASCII character set is the list of all letters, numbers, punctuation, and symbols that any computing device might need to communicate with other computing devices.

The Kurzweil Reading Machine has two RS-232 compatible ports. They are located one over the other on the back panel of the machine about 6 inches from the power on and off rocker switch. The top port must be connected to the Interface Box. The other port is not used.

The modem is connected to port B on the microcomputer as already described. The modem has two other cables which must be connected. A dedicated telephone line and an RJ11C telephone jack were installed in the workstation for the modem. A modem component, called a T-Adapter, plugs directly into the RJ11C jack. This T-Adapter has two sockets and a release button which must be depressed to unplug the T-Adapter from the RJ11C telephone jack. The socket on the left (as the user faces the T-Adapter with the release button on top) is labeled MODEM. The other socket is labeled PHONE. The cables from the telephone and the modem are plugged into their respective sockets. The other cable, a power cable, must be plugged into a standard 120-volt ac socket for electrical power.

2.2 RADIO SHACK MODEL II MICROCOMPUTER

The data processing component of the workstation is the Radio Shack Model II microcomputer. This microcomputer, also known as the TRS-80 Model II, is a powerful 8-bit microcomputer. It has 64,000 bytes of random access memory and operates under the TRS-80 Disk Operating System (TRSDOS). It has two built-in RS-232 compatible serial ports and one parallel port. It has a 12-inch high-resolution monitor which can display 24 eighty-character lines of text in the normal mode. Brightness and contrast controls for the video are located in the recessed area at the bottom left of the monitor and should be adjusted for comfortable display quality. One disk drive is built into the microcomputer. The

from the remote computer. (Note: In manual answer, the FA switch must be engaged after the DA position is selected.)

Examples of manual answer procedures:

1. When a user receives a call from another microcomputer user who wants to transmit or receive data. The caller is asked to hold the line until the user configures the microcomputer for communication. The user then asks the caller to put the caller's modem in the transmit mode and start transmitting. At this point the user will hear the data tone from the calling computer. The user then puts the MA/VO/DA switch in the DA position and pushes the FA switch up for about 3 seconds. This switch is spring loaded and will return to the original position when released. The FA switch forces the modem to answer the call. The telephone call is now being fed into the modem and not into the telephone.

2. When the microcomputer is communicating *with another microcomputer* and the two users desire to speak. One user sends over the modem the message, "Pick up your phone and let us talk." The user of the receiving workstation must then flip the MA/VO/DA/ switch to VO. The other user must flip the proper switch on the sending modem to take that microcomputer off-line. The two users can then speak. When ready to resume telecomputing, both users go through manual answer and originate procedures. (Note: In telecomputing, the calling modem is in the originate mode and the answering modem is in the answer mode. In telecomputing between a microcomputer and a mainframe computer, the mainframe is always in the answer mode. In telecomputing between microcomputers, the microcomputer users must agree before the call is made which party will be the originator so that both modems are set properly. Autodial and auto-answer modems and many other modems will automatically select the proper mode.)

3. When calling a mainframe computer whose telephone lines are frequently busy. When this modem automatically dials a busy number, it will not indicate that the call failed until it has waited 24 seconds for the answering modem to respond. Manual procedures save time under these conditions.

Detailed instructions on how to conduct a telecomputing session are given in Section 3.

SECTION 3

THE COMPUTER SYSTEM OPERATIONS

3.1 OVERVIEW

Sections 1 and 2 introduced the automated data processing (ADP) workstation, established in NAVSUP 0621C, to support computer aided warehouse design and analysis and described the workstation components. Section 3 describes the operation of all components as a system and gives step-by-step examples to illustrate how to perform various ADP functions in this workstation.

3.2 STARTUP PROCEDURES WHEN SPEECH OUTPUT IS NOT REQUIRED

The order in which the power to the various components is turned on is not significant for the proper functioning of the workstation. However, for efficient checkout of proper settings of all components, the printer is started first. The following step-by-step procedure is used to start the system when speech output is not required:

1. Check the Interface Box to make sure that the DATA RATE CONTROL switch is set to PRINTER and that the DCE/DTE switch is set to DCE.

2. Make sure there is paper in the printer. Before the power to the printer is turned on, use the platen knob (the knob on the right side of printer) to advance the paper until the print head is at the beginning of a page. (Note: The printer's manuals[2,3] refer to a page as a form.) If the power is turned on, the printer treats the initial position of the print head as the origin (top left corner) of the form. If the platen knob is turned by hand after the power is turned on, the print head will be out of synchronization with the origin of the form. The user should not turn the platen knob by hand when the power to the printer is turned on. Details on setting the margins on the printer are given in Section 3.6.

3. Turn the power on to the microcomputer. The screen will light up and the cooling fan will be heard. The system will come on with the prompt INSERT DISKETTE in the middle of the screen. Proper diskette handling procedures are presented in Appendix C.

4. Press the latch on the disk drive door until it snaps open. Note that the red light on the door latch is on. This is the only time you will ever open this door when this light is on. At other times when the red light is on, the diskette in the disk drive is spinning. The whirring sound of the disk drive is another indicator that the diskette is spinning. The disk drive does not make sounds at other times. Opening the door when the diskette is spinning can damage the diskette.

5. Insert the system diskette. The label on the diskette must face away from the screen as the diskette is inserted. Carefully push the diskette in until it stops. Close the door. The system will start loading the operating system immediately. After the operating system is loaded, the system will prompt for the date.

6. Type the date in the format MO/DA/YR (example 01/16/1984). Press the carriage return key which is labeled ENTER on the Radio Shack microcomputer. The microcomputer will now prompt for the TIME.

7. Input the time or press ENTER. The time is optional. If it is entered, use format hr.min.sec.

The system will now be configured to use the printer, Kurzweil speech output system, and modem. The screen display will show that both ports A and B are configured for communications, the FORMS function is in effect, and the HOST function is ON. The FORMS function sets the TRSDOS printer software to suit the printer and page format desired. The printer is set for 80-column paper and 66 lines per page. These parameters can be changed by the FORMS command as the user desires. The HOST ON function commands the Radio Shack Model II to check for input from port A which is connected to the terminal/printer in addition to input from its keyboard. The last screen display lines will be TRSDOS READY followed by a line of 80 dots. The printer will then type TRSDOS READY followed by a line of 80 dots. The workstation is now ready for use. Since speech output is not required, the user tells the operating system to reconfigure for use without voice output. The user communicates this information to the operating system by typing HOST OFF. The printer will then

function as a receive-only printer and its keyboard will not be able to send commands to the microcomputer. The microcomputer is ready for executing system commands, running BASIC language programs, or telecomputing. Most commercially available software is compatible with the customized operating system of this workstation and can be executed at this point.

3.3 START-UP PROCEDURES WITH SPEECH OUTPUT SYSTEM IN USE

The Kurzweil Reading Machine is the first component of the workstation that is started and initialized for operations when speech output is required. The system manager, who is the only user of speech output, is already familiar with the Kurzweil Reading Machine for reading printed materials. The description which follows will tell how to initialize the machine to read from the RS-232 port and how to control the machine during a data processing session. Machine functions such as rereading text stored in the buffer are the same regardless of whether the text entered the machine from a printed page or over the RS-232 port and will not be covered in this workstation user's manual. The following steps are performed when the workstation is used with speech output:

1. Turn the power on. The cooling fan will start and run continuously while the machine is in use. The software residing on the tape drive loads automatically in approximately 35 seconds. The machine then gives a message of administrative information citing the version of software in use, etc. The machine is now ready to start taking commands from the user.

2. Activate the Speech Output System mode. This mode enables the machine to read text entering the machine from the RS-232 port. It is activated by entering the command SET SPECIAL COMMAND 40. Entering this command requires pressing four keys on the Kurzweil's keyboard. Figure 2 shows the three keypad sections of the keyboard. Only those keys needed to initialize the system are described. The Kurzweil owner's manual[4] should be consulted if a full description of the entire keyboard is desired. The following four keys should be pressed in the

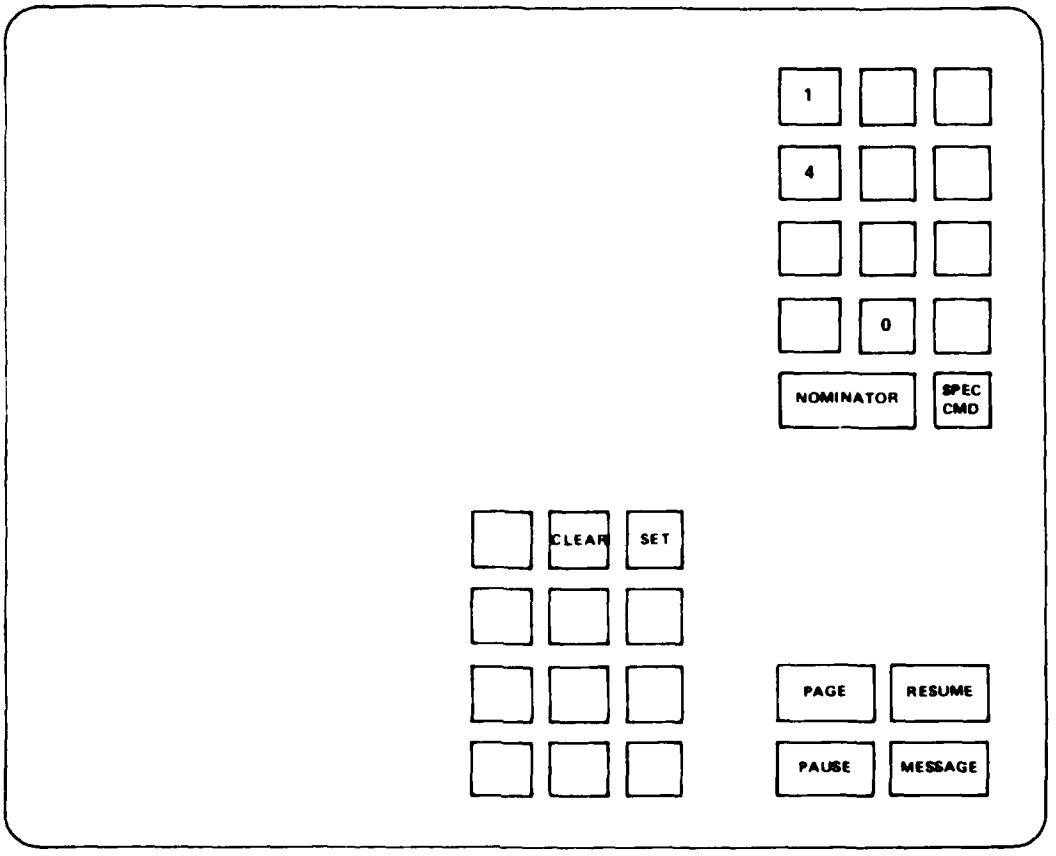


Figure 2 - Keypad Section of the Kurzweil Reading Machine Keyboard

order given: SET, SPECIAL COMMAND, 4, and 0. The NOMINATOR key can be used as necessary to locate keys. (See Section 2.5 for a description of the NOMINATOR key.) The machine will now say "SPEECH OUTPUT SYSTEM ON."

3. Activate SET SPECIAL COMMAND 41 if the Kurzweil is to be used to read a document. This command causes the Kurzweil to control the flow of data to itself so that its buffer will not overflow. To activate the command, the following four keys should be pressed in the given order: SET, SPECIAL COMMAND, 4, and 1. The machine will say "SCROLL MODE ON." (Note: If the Kurzweil is to control the data flow rate, the DATA RATE CONTROL switch on the interface box is set to KURZWEIL.)

4. Press the RESUME key on the Kurzweil's keyboard. This key is the GO key and the machine starts storing text coming through the RS-232 port after this key is pressed.

5. Check the Interface Box to make sure that the DATA RATE CONTROL switch is set to PRINTER and that the DCE/DTE switch is set to the DCE position.

6. Turn the printer on and put it in the remote mode by making sure that the LOCAL key is in the up position. Make sure that there is paper in the printer. Before the power to the printer is turned on, use the platen knob (the knob on the right side of printer) to advance the paper until the print head is at the beginning of a page. (Note: The printer's manuals refer to a page as a form.) When the power is turned on, the printer treats the initial position of the print head as the origin of the form. Avoid turning the platen knob by hand after the power is turned on because that will cause the print head to be out of synchronization with the origin of the form. Details on setting the margins on the printer are given in Section 3.6.

7. Turn the power on to the microcomputer. The screen will light up and the cooling fan will be heard. The system will come on with the prompt INSERT DISKETTE in the middle of the screen.

8. Press the latch on the disk drive door until it snaps open.

9. Insert the system diskette. The label on the diskette must face away from the screen as the diskette is inserted. Carefully push the diskette in until it stops. Close the door. The system will start loading the operating system immediately and the whirring sound of the diskette spinning will be heard. It takes about 40 seconds to load the operating system. (Caution: Do not open the disk drive door while a diskette is spinning. This could damage the diskette.) After the operating system is loaded, the system will prompt for the date.

10. Type the date in the format MO/DA/YR (example 01/16/1984). Press the carriage return key which is labeled ENTER on the Radio Shack microcomputer. The microcomputer will now prompt for the TIME. Since this microcomputer will not function until the date has been entered properly, speech output is not possible at this point. If a mistake is made during the input of the date, the date prompt will be issued again after you press the ENTER key. The best way to tell if the date has been entered properly is to press the ENTER key twice. The second time indicates to the microcomputer that you do not now wish to enter the TIME. If the date was entered properly, you will hear the diskette spinning. After a few seconds you will hear the printer typing and then the Kurzweil will say "TRISS-DOS READY," which is what the printer typed. If these things do not happen, an error was made during the input of the date. To correct, press ENTER and reenter the date. Note that there are two digits for the month, two digits for the day, and four

digits for the year. Each item is separated from the others by a slash. Continue this process until you get the response described.

11. You may now move to the keyboard of the terminal/printer. If you wish to enter the TIME, type "TIME hr.min.sec". The microcomputer is ready for executing system commands, running BASIC language programs, or telecomputing. Most commercially available software is compatible with the customed operating system of this workstation and can be executed at this point. (Note: Make sure that the keyboard is in the LOCKED position before typing TRSDOS commands.)

12. Put the DATA RATE CONTROL switch of the Interface Box in the KURZWEIL position if a document is to be printed for reading only. The Kurzweil will control the flow of data from the microcomputer to the Kurzweil and the Kurzweil's buffer will not overflow if SET SPECIAL COMMAND 41 is activated. If you wish to listen to the same text again, depress the PAUSE key on the Kurzweil keyboard to temporarily stop the flow of text to Kurzweil. When ready to start receiving new text, depress the RESUME key.

The Kurzweil has an input buffer where text stays until it is spoken. The text then moves to a memory buffer. The two buffers together hold about 5 minutes of spoken text. The RESUME, PAGE, and PAUSE keys, in conjunction with the memory control keys, are used to listen to previously heard text which is in the memory buffer (see Figure 2).

The RESUME key, as described in step 4, starts the Kurzweil speaking from the beginning of the input buffer although the text will accumulate in the input buffer as soon as SPECIAL COMMAND 40 is activated. As the input buffer becomes full, the oldest text is transferred to the memory buffer. As the memory buffer becomes full, the oldest text is lost. If text is entering the input buffer before it can be spoken, the Kurzweil will stop receiving text unless SPECIAL COMMAND 41 has been activated and the Kurzweil is controlling the flow of data from the microcomputer. If the buffer is full and text is lost, the Kurzweil will say, "BUFFER OVERFLOW - INPUT LOST." The Kurzweil will

substitute the words DOLLAR DOLLAR to indicate to the listener where text was lost.

The PAUSE key stops speech output but not the input of text. Each line of text entering memory is consecutively numbered. The Kurzweil line pointer keeps track of which line is being spoken. When the PAUSE key is pressed, the memory control functions can move the line pointer in the text to read any line selected. After a pause, the RESUME key starts speech output from the position of the line pointer. Therefore, before the RESUME key is pressed, the line pointer should be moved to the line at which the user desires speech output to begin.

The PAGE key moves the line pointer to the end of memory and will start the Kurzweil speaking from that point. A good use of the PAGE function is to skip over text. For instance, if the user is listening to a document and decides to jump ahead of what is being spoken, the PAGE key should be pressed. This forces all text into the memory buffer and the Kurzweil will start speaking the text received from the time the PAGE key was pressed. The memory control functions can be used to move the line pointer back to any text skipped over.

The MESSAGE key (see Figure 2) functions essentially as it does when the Kurzweil is reading from a printed source and should be used as necessary when the user wants the Kurzweil to give its status ("waiting for input," "speaking from memory," "speaking from input buffer," or, "waiting--please enter a command").

When the user wishes to listen to another document, the contents of the memory should be cleared first so that only the current document is in memory. There is no MEMORY CLEAR key on the Kurzweil's keyboard. The CLEAR key shown

in Figure 2 clears functions initiated by the SET key. Clearing all memory is done by resetting SET SPECIAL COMMAND 40.

3.4 TELECOMPUTING OPERATIONS

Communications can be conducted from this workstation with any host micro, mini, or maintrame computer which uses Bell compatible 103 and 212 type modems or Racal-Vadic 3400 type modem and communicates in ASCII. Communications between the microcomputer and the modem take place over port B of the microcomputer. The only communication protocol which must be observed is that port B on the microcomputer must be configured to be compatible with the host computer. This is done through the SETCOM (set communications) command in which values are set for the following four parameters:

1. baud rate (300 or 1200)
2. word length (8 bits or less)
3. parity (even, odd, or none)
4. stop bits (1 or 2)

Port B was configured during the startup for communication at 1200 baud, for 7 bits per word, for even parity, and 1 stop bit. If this port configuration is not compatible with the host computer, the user must execute the SETCOM command to reconfigure it. The configuration of a port cannot be changed unless the port is in the off state. Both ports, A and B, are configured during system startup procedures and, therefore, port B must be turned off before it can be reconfigured. If, for example, a user is to communicate with a host computer requiring a communication protocol of a 300 baud rate, 7 bits per word, even parity, and 1 stop bit, the user must type SETCOM B=OFF to turn the port off and then SETCOM B=(300,7,E,1) to make the change.

Users wh[illegible]t require speech output should follow the seven steps of Section 3.2 t[illegible]itialize the workstation for data processing and then the five steps of t[illegible]tion. A user who requires speech output should follow the 12 steps of Se[illegible] 3.3 to initialize the workstation for data processing; however, the K[illegible]well command SET SPECIAL COMMAND 41 should not be activated. The following steps should then be followed:

1. Type DO MODE3 and press ENTER. This command calls the communications software to take control of the system. A menu of actions which can be performed during communications now appears on the screen. Type E and press ENTER to execute menu item E. The microcomputer will respond "ECHO MODE ON". This causes the microcomputer to display what the user types when in the TERMINAL mode where all communications take place. If Echo mode is not turned on, the microcomputer will act on what the user types but will not display it on the screen.

2. Type T and ENTER for menu item T which puts you in the TERMINAL mode. The screen will clear and is ready for you to call your host computer.

3. Press the CTRL key and at the same time press the E key, then press the ENTER key. This will send a command to the modem that you are about to start communications. The modem responds "HELLO, I'M READY." Now you are ready for the modem to dial your host computer.

4. Type D and ENTER. The D is for dial. The modem responds by displaying NUMBER on the screen to let the user know that it wants to know what number to dial. The telephone number should be entered without spaces, preceded by 9K. (If long distance, use the 10-digit number.) In the following example, 9K3387423, the first digit, the 9, is used to reach an outside line. The K inserts a 5-second pause and gets the dial tone; the 7-digit number is then dialed. Press the ENTER key and the modem displays the number on the screen. Press the ENTER key again and the modem starts dialing the number. You should now hear the modem dialing the number. If the host computer's line is busy or the computer does not answer in 24 seconds, the modem will display FAILED CALL. If you wish to redial that same number, type a number from 1 to 9 to indicate the maximum number of times you want the modem to redial to establish communication with the host computer. Press the ENTER key again and the modem will respond DIALING. The modem will continue dialing until the host computer

answers or until the number of times specified by the user has been executed. When the host computer answers, the modem will display "ON LINE" and will not communicate with the user any more.

5. Enter Login information at this time if any is required.

The modem has many features to facilitate its use. The user should review the manual[5] on the modem so that features such as storing frequently called numbers within the modem can be used and will not have to be typed in each time. The user should also become familiar with the TRSDOS command DUAL which will allow the entire telecomputing session to be recorded on paper. Dual is not necessary to record the session on paper if the speech output system is in use and input is from the Diablo's keyboard.

3.5 CREATING TEXT FILES USING PROGRAM MODE1

MODE1 is a program developed by Computorizm Developers to allow the creation of text files such as memoranda and letters. MODE1 is not a word processing program and does not allow any text editing other than backspacing to correct a line before the carriage return is pressed. The acquisition of word processing for the workstation has eliminated much of the need for this software for those not requiring speech output at the workstation. Word processing software is not compatible with the custom features of this workstation and cannot be used when the workstation is in the speech output mode. The program MODE1 is the only available software for creating text files when speech output is required.

MODE1 resides on the system diskette and is loaded into RAM by typing DO MODE1 and pressing the carriage return. The user can then type as if at a typewriter. If the margins (see Section 3.6) on the Diablo are set, and the MARG CONT key (see Section 2.4.3) is activated, the Diablo will automatically

generate its own carriage returns. Each line of text entered will be spoken by the Kurzweil after the carriage return is pressed.

When the creation of the text file is completed, MODE1 is terminated by executing a CONTROL D (press the D key while the CONTROL key is held down). TRSDOS will respond with "TRISS-DOSS READY", which will be spoken by the Kurzweil. The text will now be stored on the diskette in a file named TYPESTOR/TXT. Each time MODE1 is entered, the file TYPESTOR/TXT is cleared. To save the file for later use, it must be renamed. The TRSDOS command RENAME can be used to rename a file. To rename TYPESTOR/TXT, type RENAME TYPESTOR/TXT TO NEWNAME, where NEWNAME is the name you wish to give to the file just created. It is a good practice to rename a text file created with MODE1 immediately after creating it so that it will not be lost when MODE1 is reentered.

Files created with MODE1 can be sent to the Kurzweil and printer by issuing the TRSDOS command PRINT followed by the name given the file.

A good use of MODE1 for all users is for creating files to set the margins and form dimensions of the Diablo printer. An example of how this can be done is given in Section 3.6.

3.6 FORMAT CONTROL FOR DOCUMENTS TO BE PRINTED

Formats for documents to be printed can be controlled by either the microcomputer or the printer. The TRSDOS command FORMS is used to set TRSDOS printer software to match the printer in use and the user's format desired.

During startup procedures (see Section 3.2) for the workstation, the TRSDOS printer software is set to 66 lines per page (including a 6-line bottom margin) and to an 80-character line width. If these values are not satisfactory, the user should issue the FORMS command defining the format desired. The

command FORMS by itself sets the FORMS parameters to their default values of 66 lines per page including a 6-line bottom margin and a 132-character line width. To enter specific values for the FORMS parameters, the user should issue the FORMS command and assign values to the parameters as illustrated by the following example:

```
FORMS P=84, L=74, W=60
```

This example will set a page length of 84 lines including a 10-line bottom margin and a line width of 60 characters.

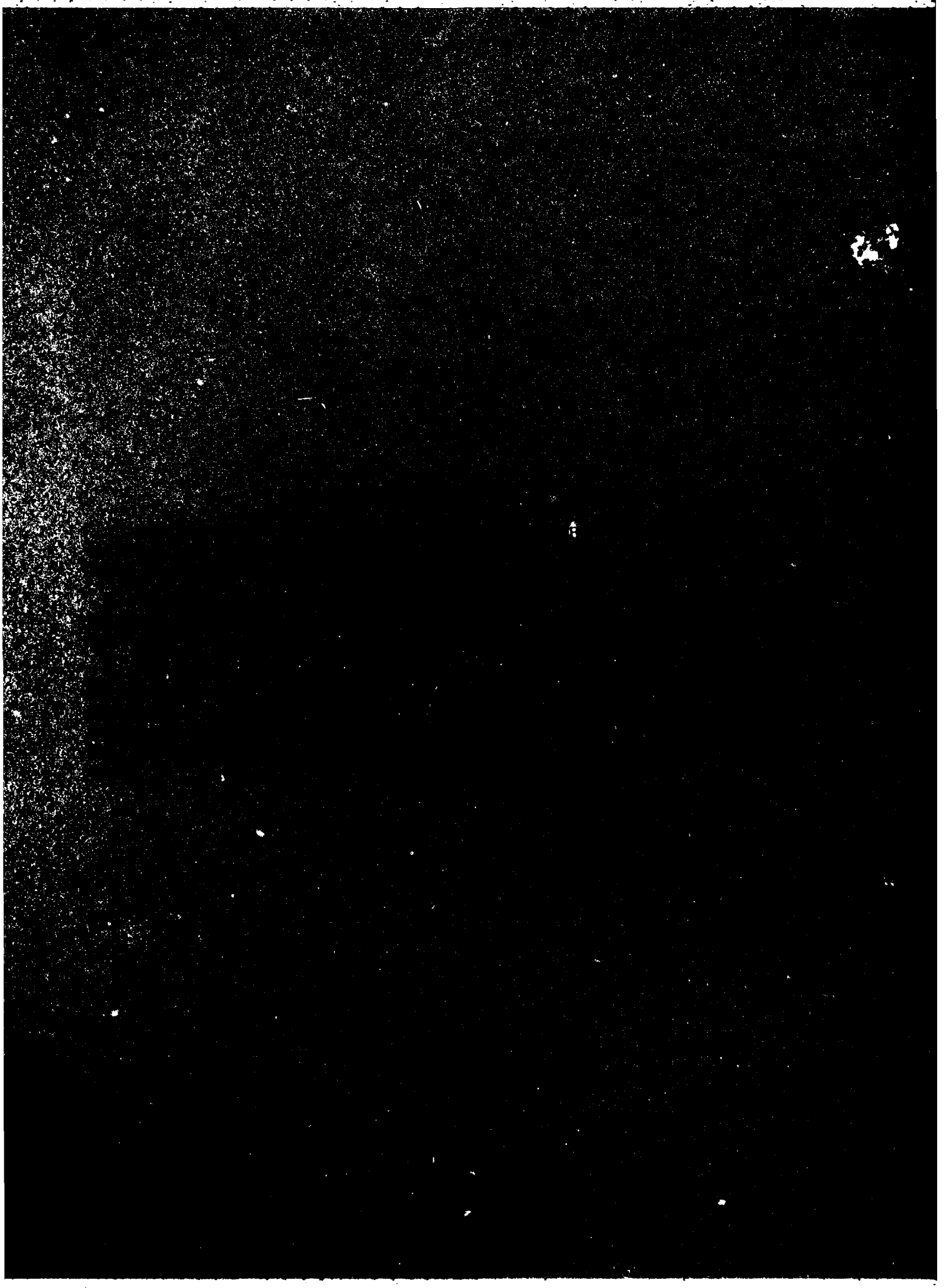
FORMS does not provide for a top margin or a left margin. The user must provide for these margins in the software. Top margins can be provided by including blank lines at the top of documents as part of the output or including the line feed command in the output to generate the top margin. Similar techniques must be used to control the left margin.

Margins and format can also be controlled with the Diablo printer, either directly from the printer's keyboard or remotely by communicating commands to the printer from the microcomputer.

Figure 3 shows a page (form) layout and the four margins which can be set by the Diablo printer. The following steps should be followed in setting margins from the Diablo's keyboard:

1. With the power to the printer turned off, advance the form manually using the platen knob until the print hammer is at the origin of the form (see Figure 3). Turn the power on.

2. Set the top margin first. The LINE FEED key is used to advance the print head to the line at which the top margin is to be set. Execute an ESC T command by pressing the ESC key and simultaneously pressing the T key. The ESC command alerts the printer that the character following the ESC command is a command to the printer and is not a character



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APPENDIX C

DISKETTE HANDLING AND CARE

Diskettes are sophisticated storage media and their proper care and handling are important. If diskettes are not handled correctly, they may become unusable. The following procedures should be used in all diskette handling:

1. Do not touch the magnetic surface (any shiny part) with your fingers. Oil naturally present on fingers is nearly impossible to remove from the diskette and will destroy it.

2. Do not bend or crimp a diskette.

3. Do not eat, drink, or smoke near diskettes (or the microcomputer). If anything is spilled on a diskette, that diskette is destroyed and should never be placed in the disk drive again because it could damage the disk drive.

4. Do not allow the diskettes to be exposed to magnetism. Data is magnetically stored on diskettes and can be altered by any magnetic source. Magnetism is present in electric motors, telephones, speakers, etc. Telephones and electric typewriters are two magnetic sources that have been responsible for the accidental erasure of many diskettes.

5. Insert the diskette into the disk drive very carefully and close the door. Do not force it.

6. Do not attach anything to the diskette with a paper clip. Fill out as much as possible of labels before they are attached. Use only felt tip pens to write on labels attached to diskettes.

7. Always make sure the disk drive is empty when the microcomputer is turned on or cut off.

8. Store diskettes in an upright position. Diskettes should be placed in their jackets when not in use. Diskettes should be protected from dust at all times.

9. Make a back-up copy of an important file on a separate diskette as a precaution.

The right rotary knob switch is the spacing select switch. This switch controls the horizontal spacing of the characters. Character spacing per inch is referred to as pitch. For instance, 10-pitch means that 10 characters can be typed per inch. Pica (10-pitch) and Elite (12-pitch) are used in most business correspondence. The user must ensure that the print spacing selected is compatible with the print wheel used. Possible settings for print spacing are as follows:

Switch Setting	Function
0	Proportional space (used with proportional spacing print wheels)
1	10-pitch character spacing
2	12-pitch character spacing
3	15-pitch character spacing
4-9	Special printer self-test operations (see reference manuals)

The print wheel and spacing switches are set to 7 and 2, respectively.

RIGHT DIP SWITCH MODULE

Switch	Position	Function
1	Up	Full duplex operations activated
2	Up	Enables parity checking
3	Down	Works with switch 5 to select 1200 baud
4	Down	Not used
5	Up	Works with switch 3 to select 1200 baud
6	Up	Selects even parity
7	Down	Enables out-of-paper sensing
8	Down	Not used

The left rotary switch is the print wheel selection switch and must be set to correspond to the print wheel in use. Print wheels wear out and have to be replaced. Several different types of print wheels can be used, but care must be exercised to ensure that the print wheel used corresponds with the keyboard characters. The printer's keyboard is the standard ASCII which requires a 96-character print wheel. The print wheels corresponding with this keyboard and the corresponding rotary switch settings are as follows:

Switch Setting	Print Wheel
3	96-character metal - Rank Xerox
4	96-character metal - Diablo
7	96-character plastic

APPENDIX B

CORRECT SETTINGS FOR SWITCHES LOCATED UNDER THE ACCESS COVER OF THE DIABLO MODEL 630 KSR TERMINAL/PRINTER

The two dip switch modules and two rotary knob switches under the access cover have been set for the functions required of the terminal/printer in the workstation. The access cover is held in place by magnets and is removed by pulling straight out. Those dip switch settings should not be changed.

Each dip switch module has eight switches. The dip switches are on in the up position and off in the down position. The settings for the switches of the two dip switch modules and the functions controlled by each switch are as follows:

LEFT DIP SWITCH MODULE

Switch	Position	Function
1	Down	Generates one line feed on each carriage return when switch 3 is up
2	Down	Not used
3	Up	Generates one line feed on each carriage return, when switch 1 is down
4	Down	Not used
5	Down	Generates upper and lower case characters per SHIFT key
6	Down	Not used
7	Down	Disables keyboard entry of HERE IS message
8	Down	Not used

may access any file on the diskette in the drive. The user must make sure that the desired files are on that diskette. MODE4 should be used only by very experienced users.

MODE3 - COMMUNICATION

MODE3 allows the operator to communicate with another computer over telephone lines via the modem. The modem's auto dial menu may be accessed while in this mode.

This mode may be entered from MODE2 by typing DO MODE3 while at either keyboard. All input and output will be sent and received on both the microcomputer and the printer and will be spoken by the Kurzweil.

The TERMINAL program provided with TRSDOS is used for this function. Instructions are provided with the Radio Shack owner's manual, and the use of the TERMINAL program will depend on the remote computer.

Note that the TERMINAL program may be modified and saved using the DUMP command to allow efficient entry to specific, remote computers. Experienced users usually create customized versions of TERMINAL.

MODE4 - REMOTE INTERACTIVE MODE

MODE4 allows the microcomputer to be operated from a remote terminal. This mode could be used if a user desires to use the microcomputer at night or on weekends. MODE4 is the only mode requiring a hardware connection change. MODE4 is entered by plugging the modem into port A instead of port B. All the equipment should be turned off before the cables are switched. The microcomputer is then turned on and also the printer if it is to be used. If the printer is to be used, the microcomputer should be in normal TRSDOS and not MODE2 because it prints to port A.

A user from a remote computer may access the microcomputer via the modem. When the data tone is received from the modem, the user issues a carriage return. The microcomputer will respond "TRSDOS READY". The remote computer

be overwritten by the next MODE1 session. This mode may be used to create text files to be sent over the modem or printed by the Diablo printer. This capability allows quick format changes without going through the tedious steps required each time a different format is desired. The instructions for formatting the Diablo from the keyboard are contained in the operator's manuals.

MODE2 - LOCAL INTERACTIVE MODE

MODE2 is the default mode for the system and is in effect any time the DO file, SETUP is executed (i.e., DO SETUP). The system reverts to MODE2 when exiting from MODE1 or MODE3. While the system is in MODE2, the keyboards of either the microcomputer or the Diablo can be used to control the data processing session. Any output sent to the microcomputer's screen is also sent to the Diablo and the Kurzweil. Most programs written for the Radio Shack MODEL II microcomputer under the TRSDOS operating system will run in this mode.

The following sequence of commands is issued to TRSDOS to initiate MODE2:

SETCOM A=(1200,7,E,1) - sets the A serial port to 1200 baud, seven bit word length, even parity, and 1 stop bit. The printer and Kurzweil communicate with the microcomputer through this port.

SETCOM B=(1200,7,E,1) - sets the B serial port. (Note: The TERMINAL has been modified to operate with port B instead of port A as described in the Radio Shack Model II owner's manual.)

FORMS S,W=80 - commands the operating system to use the serial printer with a default line length of 80 characters. The command has been modified to use port A instead of Port B as described in the Radio Shack owner's manual.

FORMS X - causes the computer to bypass any filtering of the output to the printer to allow full use of the Diablo's command set.

HOST ON - causes the operating system to check port A for any input as well as checking the microcomputer's keyboard. Any video output is also sent via port A to the printer.

APPENDIX A

DESCRIPTION OF SOFTWARE DEVELOPED BY COMPUTORIZM DEVELOPERS FOR THE NAVSUP WORKSTATION

In fulfilling its contract to customize hardware and software to our requirements, Computorizm Developers modified the TRSDOS operating system and developed four software programs. This appendix presents a summary of the four software programs MODE1, MODE2, MODE3, and MODE4 based on the software description provided by Computorizm Developers.

MODE1 - STORAGE TYPEWRITER

This mode allows the computer to remember all input from the DIABLO's keyboard. In essence, the system acts like a player piano in the record mode and stores the session in a diskette file called TYPESTOR/TXT. This mode is initiated by typing DO MODE1 and pressing the ENTER key on the keyboard of either the microcomputer or the terminal/printer. MODE1 can be used with or without the Kurzweil speech output system. If the speech output system is in use, text is transmitted to the Kurzweil and spoken each time the carriage return is pressed. The operator may exit MODE1 by issuing the command CONTROL D. On exit, the typing session will have been stored in the file TYPESTOR/TXT. The microcomputer does not filter or interpret the input at all so that the special instruction set of the Diablo printer may be used to the maximum. All output from either keyboard will be sent to the Kurzweil.

To recall the session, type PRINT TYPESTOR/TXT and the session will be repeated exactly as it was created. To permanently save the file, use the TRSDOS function RENAME to rename the file to a permanent file (RENAME TYPESTOR/TXT TO YOURFILE). If you do not rename the file TYPESTOR/TXT, it will

All margins should now be set. Two frequent errors in setting margins are:

1. not having the LOCK key in the proper position, and

2. not issuing the carriage return following the ESC sequence.

All ESC sequences which can be issued from the keyboard of the Diablo can also be issued directly from the microcomputer. Commands for setting the margins on the Diablo can be prepared using MODE1 and stored on a diskette. When the user desires to use those margins, it is only necessary to use the PRINT command to print that file. No text is generated, but the printer is set to the margins contained in the file.

The file MARG3/PRT on the system diskette was prepared by Computorizm Developers as an example of a Radio Shack Model II file which will set the margins on the Diablo printer.

to be printed. The ESC sequence is terminated by a carriage return. The top margin is now set. (Note: To issue the T command, the LOCK key must be in the down position).

3. Set the left margin next. The SPACE BAR and BACKSPACE keys should be used to move the print head to the desired left margin. Execute an ESC 9 sequence followed by a carriage return. The 9 must be typed from the alphanumeric section of the keyboard with the LOCK key in the up position.

4. Set the right margin next. The SPACE BAR and BACKSPACE keys should be used to move the print head to the desired right margin. Execute an ESC 0 (zero) sequence followed by a carriage return.

5. Set the bottom margin next. The LINE FEED key is used to advance the print head to the line at which the bottom margin is to be set. Execute an ESC L sequence followed by a carriage return.

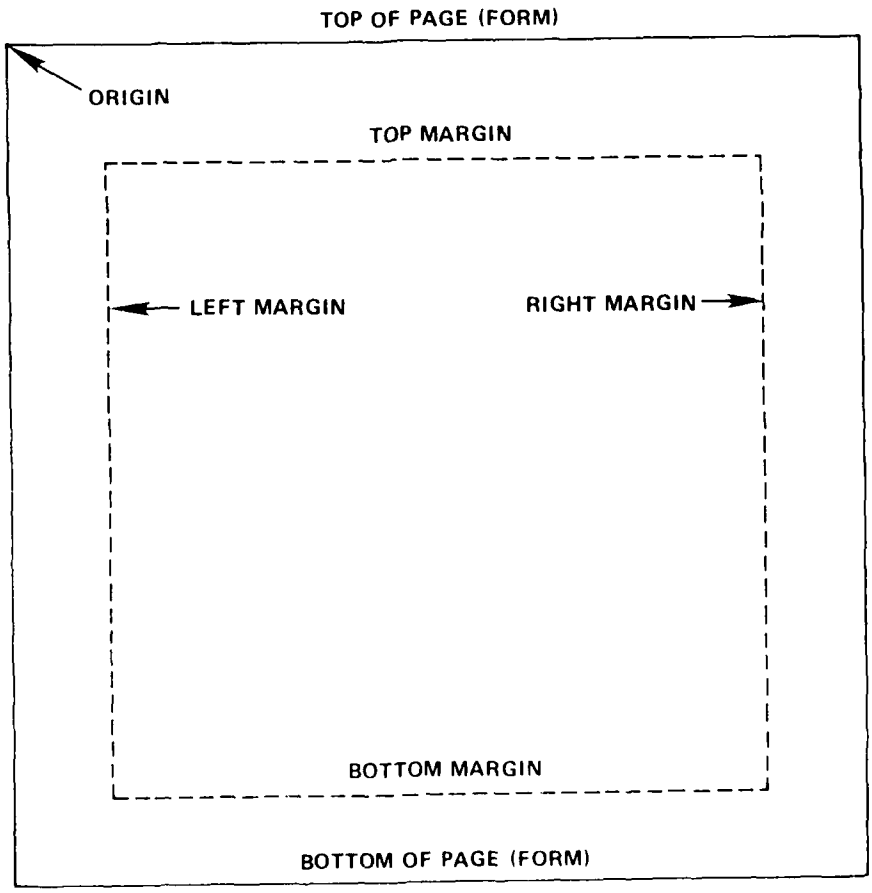

Figure 3 - Page (Form) Layout Using the Diablo Model 630 KSR Printer for Format Control

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